Some type specimens of Isopoda (*Flabellifera*) in the British Museum (Natural History), and the isopods in the Linnaean Collection

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Introduction

British Museum (Natural History) collection

The first catalogue of the crustacean collection was compiled by Adam White and published in 1847. The foundation of that collection was W. E. Leach's material, acquired by the Museum in 1826. This contained the type material of approximately 140 crustacean species described by Leach, 37 of which belong to the suborder Flabellifera. Between 1826 and the publication of White's catalogue the collection was augmented from various sources. The most notable additions to the marine Isopoda were from the collections of George Montagu, Thomas Say, and those made during the voyages of H. M. Ships *Erebus* and *Terror* to the Antarctic.

In 1863 the Museum acquired from the Linnean Society Sir Joseph Banks' collection. Unlike the insects, the crustaceans from Banks' collection were not registered, and no record exists of the species it contained. Five species of *'Oniscus'* described by J. C. Fabricius (1775) were from Banks' collection, and although the types of all five were considered by Zimsen (1964) to be lost, recent investigations have established that two of these, *Ceratothoa imbricata* and *Serolis paradoxa* are still in the BM(NH) collections*. The other three species are amphipods (see Stebbing, 1888).

In the latter half of the nineteenth century the dry collection of isopods was augmented from various sources, especially from the voyages of H. M. Ships *Herald* and *Rattlesnake* (see Miers, 1884 p. 179). It also included the type material of several species described by E. J. Miers, the Assistant in charge of Crustacea from 1872 to 1885 (see Gordon, 1971).

Although parts of the Crustacea collection have been catalogued since 1847 (see Bell, 1855; Bate, 1862; Thurston & Allen, 1969; Lincoln & Ellis, 1974; Lincoln & Hurley, 1974; Ellis & Lincoln, 1975), this is the first attempt since White's to catalogue the marine isopods, and this paper is intended as a precursor to a catalogue of the entire flabelliferan type collection which contains an estimated 200 species from some 50 genera.

The Linnaean collection

Linnaeus' collection was bought from his widow by J. E. Smith in 1774. It remained in Smith's possession until his death in 1828, and a year later it was purchased by the Linnean Society of London.

The isopod collection, preserved dry, now consists of 13 specimens (see p. 127) labelled in Linnaeus' handwriting and which must be considered holotypes. (A specimen labelled '*ceti*' included among these is the parasitic amphipod *Cyamus ceti* (L., 1758).) There are also 28

*The holotypes of *Serolis paradoxa* and *Ceratothoa imbricata* were collected during Capt. Cook's first voyage (1768–1771). Much of the zoological material collected during Cook's voyages has become widely dispersed and/or lost, and these specimens were overlooked when Whitehead (1969) compiled his account of the traceable specimens.

Bull. Br. Mus. nat. Hist. (Zool.) **40** (4) : 121–128 Issued 30 July 1981

unlabelled specimens that have been provisionally determined. These comprise: 4 *Exosphaeroma gigas* (Leach, 1818); 2 *Exosphaeroma* sp.; 4 *Parisocladus perforatus* (Edwards, 1840); 1 *Idotea carinata,* Miers 1881 (= *Synisoma* sp.); 1 *Paridotea ungulata* (Pallas, 1772); 1 *Paridotea rubra* Barnard, 1914; 1 *Aega tridens* Leach, 1815; 2 *Ceratothoa imbricata* (Fabricius, 1775); 1 amphipod (family Stegocephalidae); 1 *Ligidium* sp.; 1 *Asellus aquaticus* (L., 1758) (anterior half only); 1 *Nerocila serra* Schiodte & Meinert, 1881; 1 *Idotea granulosa* Rathke, 1843; 1 *Idotea chelipes* (Pallas, 1766); 1 *Ligia dilatata* Brandt, 1833; 1 *Ligia oceanica* (L., 1767); 4 Oniscoidea.

Smith was known to have augmented Linnaeus' zoological collection with material of his own (Jackson, 1890) and these unlabelled specimens may have been added by him.

Methods

Until the latter half of the nineteenth century, small crustaceans were curated at the BM(NH) in a similar manner to entomological specimens *i.e.* impaled with entomological pins and stored dry in insect cabinets. Throughout the last 150 years the condition of many of these crustaceans has deteriorated, chiefly resulting from repeated movement of the dry collection. Appendages have become detached, specimens broken in half, and a few have disintegrated completely. To prevent further deterioration of valuable type material and to make it more easily accessible for study, a decision was taken to transfer specimens to alcohol for incorporation in the Museum's spirit collection. The techniques used for rendering the dried specimens suitable for alcohol preservation are given below.

In order to allow restorative chemicals to penetrate the body tissues air must be expelled from the specimen. Sometimes this can be achieved following direct immersion into 80% IMS (industrial methylated spirit). If the specimen fails to sink gentle heat should be applied until the solution reaches boiling point, immediately after which the container should be allowed to cool. Following either procedure the air-free specimen is placed into distilled water for one hour and then relaxed using one of the chemical methods described below, each of which has particular advantages or disadvantages as noted. After this chemical treatment the specimen is again immersed into distilled water for one hour and then transferred to 80% IMS for storage.

Chemical treatments

All solutions were made with distilled water.

(*a*) 1·2% sodium chloride. Length of time: dependent on size of specimen, 4–5 hours for small specimens; up to 24 hours for large specimens. This method takes longer than others, but this can be an advantage with small or fragile specimens.

(*b*) 2% tri-sodium orthophosphate. Length of time: 4–6 hours. A close watch must be kept on the specimens from 4 hours onwards, as they may become too flaccid. A further disadvantage of this technique is that a cloying, flocculent precipitate may develop, mostly at the bases of the appendages. As this precipitate has to be removed by mechanical means, damage to the specimen can occur unless extreme care is taken.

(*c*) 0·5% formaldehyde OR 5% sodium sulphate. Length of time: 3½–6 hours, but may safely be left overnight as prolonged immersion does not seem to be deleterious.

(*d*) 2% citric acid and 20% sodium citrate in equal parts. Length of time: up to 4 hours. In the limited trials of this technique, the specimens have a tendency to become too flaccid.

(*e*) Sandison's technique: 90% ethyl alcohol—30 volumes; 0·5% formaldehyde—50 volumes; 5% sodium citrate—20 volumes. Length of time: 1–24 hours. The results produced by this technique were very variable. Reasonable results were obtained when fragile specimens were immersed for 1–2 hours, but larger, more robust specimens sometimes remained largely unaffected.

British Museum (Natural History) Collection

AEGIDAE

Aega bicarinata Leach (1818 : 349)
HOLOTYPE: 1979 : 306 : 1. Mediterranean? Presented by W. E. Leach.
Aega emarginata Leach (1815 : 370) [transferred to *Aega psora* (L., 1758)]
HOLOTYPE: 1979 : 309 : 1. Locality unknown. Presented by W. E. Leach.
Aega meinerti Miers (1884 : 305)
HOLOTYPE: 1858 : 172. King George Sound, Western Australia. Presented by F. M. Rayner, H.M.S. *Herald.*
Aega monophthalma Johnston (1834 : 233)
HOLOTYPE: 1979 : 299 : 1. Berwick Bay, Northumberland. On large codfish. Presented by G. Johnston.
Rocinela danmoniensis Leach (1818 : 349)
HOLOTYPE: 1979 : 328 : 1. Plymouth Sound. Presented by W. E. Leach.

CIROLANIDAE

Cirolana cranchi Leach (1818 : 347)
HOLOTYPE: 1979 : 279 : 1. Falmouth, Cornwall. Presented by Mr Cranch.
Cirolana harfordi (Lockington) (1877 : 46, as *Aega harfordi*)
PARATYPES: 1878 : 9 (4 specimens). Santa Rosa Island. Under stones, MT, in muddy places. Collected by W. G. W. Harford. Presented by W. N. Lockington & W. G. W. Harford.
Cirolana rossi Miers (1876a : 228)
SYNTYPES. 1856 : 33 (2 specimens). New Zealand. H.M.S. *Herald.* Purchased of Mr *Erebus*—The Antarctic Voyage'. Presented by Lieut. A. Smith.
SYNTYPES: 1844 : 3 (7 specimens). Auckland Is. Antarctic Expedition. Presented by Capt. James Clarke Ross.
SYNTYPE: 1848 : 80. New Zealand. Collected by Rev. W. Colenso. Presented by Dr J. Hooker.
SYNTYPE: 1856 : 33 (2 specimens). New Zealand. H.M.S. *Herald.* Purchased of Mr Cuming.
Cirolana tenuistylis Miers (1884 : 303)
SYNTYPES: 1862 : 53 (2 specimens). Locality unknown. Collected by F. M. Rayner, H.M.S. *Herald.* Presented by Mr Warwick.
Conilera montagui Leach (1818 : 348) [transferred to *Conilera cylindracea* (Montagu, 1804)]
HOLOTYPE: 1979 : 289 : 1. Salcombe, Devonshire. Presented by G. Montagu.
Eurydice pulchra Leach (1818 : 370)
SYNTYPES: 1979 : 290 (2 specimens). Bantham, Devonshire. Presented by W. E. Leach.
Nelocira swainsoni Leach (1818 : 347) [transferred to *Cirolana cranchi* Leach, 1818]
SYNTYPES: 1979 : 288 (3 specimens). Sicily. Collected and presented by W. Swainson.

CYMOTHOIDAE

Anilocra capensis Leach (1818 : 350)
SYNTYPES: 1979 : 329 (3 specimens). Cape of Good Hope. Presented by W. E. Leach.
Anilocra cuvieri Leach (1818 : 350) [transferred to *Anilocra physodes* (L., 1758)]
SYNTYPES: 1979 : 332 (3 specimens). Island of Iviça (Ibiza?), Mediterranean. Presented by G. Cuvier.
Anilocra mediterranea Leach (1818 : 350) [transferred to *Anilocra physodes* (L., 1758)]
HOLOTYPE: 1979 : 330 : 1. Sicily. Presented by W. E. Leach.
Canolira rissoniana Leach (1818 : 350) [= *Anilocra* sp.]
HOLOTYPE: 1979 : 331 : 1. Locality unknown. Presented by W. E. Leach.
Ceratothoa imbricata (Fabricius) (1775 : 296, as *Oniscus*)

HOLOTYPE: 1979 : 403 : 1. New Zealand, Capt. Cook's first voyage. Sir Joseph Banks' collection. Presented by the Linnean Society of London.

Cymothoa banksii Leach (1818 : 353) [transferred to *Ceratothoa imbricata* (Fabricius, 1775)]

HOLOTYPE: 1979 : 402 : 1. New Zealand. Presented by W. E. Leach.

Cymothoa dufresni Leach (1818 : 352) [transferred to *Cymothoa oestrum* (L., 1758)]

SYNTYPES: 1979 : 405 (2 specimens). Locality unknown. Presented by W. E. Leach.

Cymothoa leschenaultii Leach (1818 : 352) [transferred to *Cymothoa eremita* (Brünnich, 1783)]

HOLOTYPE: 1979 : 406 : 1. Pondicherry, India. Presented by Leschenault.

Cymothoa mathieui Leach (1818 : 353) [transferred to *Cymothoa eremita* (Brünnich, 1783)]

SYNTYPES: 1979 : 407 (2 specimens). 'Ile-de-France'. Presented by M. Mathieu.

SYNTYPE?: 1979 : 408. 'Ile-de-France'. Sir Joseph Banks' collection. Presented by the Linnean Society of London.

Cymothoa trigonocephala Leach (1818 : 353) [transferred to *Ceratothoa imbricata* (Fabricius, 1775)]

SYNTYPES: 1979 : 404 (2 specimens). Locality unknown. Presented by W. E. Leach.

Lironeca contracta Miers (1880 : 466, footnote)

SYNTYPE: 1844 : 105. Australia. Presented by the Earl of Derby.

SYNTYPE: 1846 : 89. Australia. Presented by J. B. Jukes.

Lironeca desmarestii Leach (1818 : 352) [transferred to *Lironeca redmani* Leach, 1818]

SYNTYPES: 1979 : 336 (3 specimens). Locality unknown. Presented by W. E. Leach.

Lironeca laticauda Miers (1877 : 677)

SYNTYPES: 1862 : 96 (2 specimens). Manchuria. Purchased of Stevens.

Lironeca micronyx Miers (1880 : 466, footnote)

SYNTYPES: 1846 : 104 (3 specimens). Mauritius. Presented by R. Templeton.

Lironeca novaezealandiae Miers (1876*a* : 228) [transferred to *Lironeca raynaudi* Milne Edwards, 1840]

SYNTYPES: 1845 : 30 (2 specimens). New Zealand. Presented by Mr Earl.

Lironeca ovalis (Say) (1818*a* : 394, as *Cymothoa*)

SYNTYPE: 1979 : 413. N. America. Presented by T. Say.

Lironeca rafineskii Leach (1818 : 352)

SYNTYPES: 1979 : 338 (2 specimens). Cape of Good Hope? (but see original description—'localité inconnu'). Presented by W. E. Leach.

Lironeca redmani Leach (1818 : 352)

HOLOTYPE: 1979 : 401 : 1. Jamaica. Presented by Lieut. Redman.

Lironeca vulgaris Stimpson (1857 : 508). See also Stimpson 1859 : 88

SYNTYPES: 1878 : 9 (3 specimens). San Francisco Market. Presented by W. N. Lockington & W. G. W. Harford.

Nerocila blainvillei Leach (1818 : 351)

SYNTYPES: 1979 : 400 (2 specimens). Sicily? (but see original description—'localité inconnu'). Presented by W. E. Leach.

Nerocila congener Miers (1880 : 468, footnote)

HOLOTYPE: 1979 : 337. Philippine Islands. Presented by Mr Cuming.

Nerocila longispina Miers (1880 : 468)

HOLOTYPE: 1849 : 86. Malabar. Presented by I. Ward.

Nerocila macleayi Miers (1884 : 301) [nom. nov. for *Nerocila imbricata* (Fabricius): Miers 1876*a vide* Miers 1884]

SYNTYPE: 1845 : 30 (as *Nerocila imbricata* (Fabricius): White 1847) New Zealand. Presented by Mr Earl.

SYNTYPE: 1979 : 414 : 1 (as *Nerocila imbricata* (Fabricius): White 1847). Locality and donor unknown.

SYNTYPE: 1979 : 417 : 1 (as *Cilonera macleayii* White & Doubleday 1843 *nom. nud.*). 'Africa'. Presented by W. E. Leach.

SYNTYPE: 1842 : 44 (as *Cilonera macleayii* White & Doubleday 1843 *nom. nud.*). New Zealand. Presented by Andrew Sinclair.

SYNTYPE: 1847 : 104. New Zealand. Presented by Andrew Sinclair.

SYNTYPE: 1979 : 415 : 1. New Zealand 'taken out of the mouth of a fish'. Presented by Andrew Sinclair.

SYNTYPE: 1850 : 12. West coast, America. Presented by Capt. Kellett & Lieut. Wood.

SYNTYPE: 1979 : 416 : 1. Locality and donor unknown.

Nerocila trichiura (Miers) (1877 : 677, as *Anilocra*)

HOLOTYPE: 1846 : 104. Mauritius. Presented by Robert Templeton.

Olencira lamarckii Leach (1818 : 351) [transferred to *Olencira praegustator* (Latrobe, 1802)]

HOLOTYPE: 1979 : 333 : 1. Locality unknown. Presented by W. E. Leach.

LIMNORIIDAE

Limnoria terebrans Leach (1814 : 433) [transferred to *Limnoria lignorum* (Rathke, 1799)]

SYNTYPES: 1979 : 445 (3 specimens). Bell Rock, Scotland. Collected by R. Stevenson. Presented by W. E. Leach.

SEROLIDAE

Serolis fabricii Leach (1818 : 340) [transferred to *Serolis paradoxa* (Fabricius, 1775)]

HOLOTYPE: 1979 : 452 : 1. Senegal. Presented by W. E. Leach.

Serolis latifrons Miers (1875*a* : 74)

SYNTYPE: 1843 : 70. Rendezvous Cove, Auckland Is. 'Collected in the *Erebus*—The Antarctic Voyage'. Presented by Lieut A. Smith.

Serolis paradoxa (Fabricius) (1775 : 296, as *Oniscus*)

HOLOTYPE: 1979 : 451 : 1. Tierra del Fuego, Capt. Cook's first voyage. Sir Joseph Banks' collection. Presented by the Linnean Society of London.

Serolis septemcarinata Miers (1875*b* : 116)

SYNTYPES: 1843 : 70 (2 specimens). Crozet Islands. 'Collected in the *Erebus* during the Antarctic voyage'. Presented by Lieut. A. Smith.

SPHAEROMATIDAE

Ancinus depressus (Say) (1818*b* : 483, as *Naesa*)

SYNTYPE: 1979 : 444 : 1. North America. Presented by Thomas Say.

Campecopea cranchi Leach (1818 : 341) [transferred to *Campecopea hirsuta* (Montagu, 1804)]

SYNTYPES: 1979 : 441 (2 specimens). Falmouth, Cornwall. Collected by Mr Cranch. Presented by W. E. Leach.

Campecopea hirsuta (Montagu) (1804 : 71, as *Oniscus*)

SYNTYPES: 1979 : 440 (3 specimens). Devon. Presented by G. Montagu.

Cassidinidea ovalis (Say) (1818*b* : 484, as *Naesa*)

SYNTYPE: 1979 : 422 : 1. North America. Presented by Thomas Say.

Cilicaea antennalis Miers (1884 : 310)

HOLOTYPE: 1979 : 442 : 1. Swan River, W. Australia. Presented by Sir J. Richardson.

Cilicaea latreillei Leach (1818 : 342)

SYNTYPES: 1979 : 443 (2 specimens). Locality unknown. Presented by W. E. Leach.

Cilicaea latreillei var. *longispina* Miers (1884 : 310)

HOLOTYPE: 1851 : 33. Bass Strait. HMS *Rattlesnake*. Presented by J. Macgillivray.

Cymodoce bifida Leach (1818 : 343)

HOLOTYPE: 1979 : 431. Locality unknown. Presented by W. E. Leach.

Cymodoce convexa Miers (1876*a* : 229)

SYNTYPES: 1852 : 43 (3 specimens). New Zealand. Purchased of Mr Cuming.

Cymodoce emarginata Leach (1818 : 342)

SYNTYPE: 1979 : 434 : 1. Mount Edgecombe, near Plymouth, Devon. Variety 'a'. Collected and presented by W. E. Leach.

SYNTYPE: 1979 : 435 : 1. Falmouth, Cornwall. Variety 'b'. Collected by Mr Cranch. Presented by W. E. Leach.

Cymodoce lamarcki Leach (1818 : 343) [transferred to *Cymodoce truncata* Leach, 1814]

SYNTYPES: 1979 : 436 (2 specimens). Sicily. Collected by W. Swainson. Presented by W. E. Leach.

Cymodoce truncata Leach (1814 : 433)

HOLOTYPE: 1979 : 439 : 1. Devon. Presented by W. E. Leach.

Dynamene montagui Leach (1818 : 344) [transferred to *Dynamene bidentata* (Adams, 1800)]

SYNTYPES: 1979 : 430 (3 specimens). Devon. Presented by G. Montagu.

Dynamene rubra Leach (1818 : 344) [transferred to *Dynamene bidentata* (Adams, 1800)]

SYNTYPES: 1979 : 428 (4 specimens). Devon. Presented by W. E. Leach.

Dynamene viridis Leach (1818 : 344) [transferred to *Dynamene bidentata* (Adams, 1800)]

SYNTYPES: 1979 : 429 (3 specimens). Devon. Presented by W. E. Leach.

Exosphaeroma coatsi Tattersall (1913 : 885)

SYNTYPE: 1979 : 425 (fragment). St. Paul Island, Indian Ocean. Presented by J. Macgillivray.

Exosphaeroma gigas (Leach) (1818 : 346, as *Sphaeroma*)

SYNTYPE: 1941 : 6 : 27 : 5. Locality unknown. Presented by W. E. Leach.

SYNTYPE: 1979 : 420 : 1. Locality unknown. Sir Joseph Banks' collection. Presented by the Linnean Society of London.

Exosphaeroma kraussi Tattersall (1913 : 884)

SYNTYPES: 1881 : 19 (14 specimens). Sea Point, Cape Town, South Africa. Presented by A. E. Craven.

Exosphaeroma lanceolatum (White) (1843 : 345, as *Sphaeroma gigas* var. *lanceolatum*)

SYNTYPES: 1842 : 4 (White (1847 : 102) refers to 4 specimens, but there are 7 with this registration number). Falkland Islands. Presented by W. E. Wright.

Isocladus spiniger var. *recurvatus* Miers (1876*b* : 113) [transferred to *Isocladus armatus* (Milne Edwards, 1840)]

HOLOTYPE: 1856 : 164. New Zealand. Presented by Dr Sinclair.

Isocladus tristensis (Leach) (1818 : 345, as *Sphaeroma*)

SYNTYPES: 1979 : 453 (4 specimens). Tristan d'Acunha. Collected by Capt. Carmichael. Presented by W. E. Leach.

Sphaeroma curtum Leach (1818 : 345) [transferred to *Cymodoce truncata* Leach, 1814]

HOLOTYPE: 1979 : 418 : 1. Britain. Presented by W. E. Leach.

Sphaeroma dumerilli Leach (1818 : 345) [transferred to *Cymodoce truncata* Leach, 1814]

SYNTYPES: 1979 : 432 (2 specimens). Genoa. Presented by W. E. Leach.

SYNTYPE: 1979 : 433. Sicily. Presented by W. E. Leach.

Sphaeroma hookeri Leach (1814 : 433)

SYNTYPES: 1979 : 421 (4 specimens). Suffolk [Leach (1814) gives locality as Norfolk, but see Leach (1815 : 369; 1818 : 345)]. Collected by W. J. Hooker. Presented by W. E. Leach.

Sphaeroma olivacea Lockington (1877 : 45) [transferred to *Gnorimosphaeroma oregonensis* (Dana, 1853)]

SYNTYPES: 1878 : 9 (3 specimens). San Francisco Bay. Presented by W. N. Lockington & W. G. W. Harford.

Sphaeroma prideauxianum Leach (1818 : 345) [transferred to *Cymodoce truncata* Leach, 1814]

HOLOTYPE: 1979 : 423 : 1. Devon. Collected by C. Prideaux. Presented by W. E. Leach.

Sphaeroma quadridentatum Say (1818*a* : 400)

SYNTYPES: 1979 : 419 (4 specimens). St Catherine Island, Georgia, U.S.A. Presented by T. Say.

Sphaeroma rugicauda Leach (1814 : 405 & 433)
SYNTYPES: 1979 : 424 (5 specimens). Ulva I., Argyll, Scotland. Presented by W. E. Leach.
Zuzara diadema Leach (1818 : 344)
HOLOTYPE: 1979 : 426 : 1 (fragment). Australia. Collected by R. Brown. Presented by W. E. Leach.
Zuzara semipunctata Leach (1818 : 344)
HOLOTYPE: 1979 : 427 : 1. Locality unknown. Presented by W. E. Leach.

Linnaean Collection

Oniscus asilus L. (1758 : 636) [redet. *Nerocila* sp.]
Cymothoa oestrum (L.) (1758 : 636)
Aega psora (L.) (1758 : 636)
Anilocra physodes (L.) (1758 : 636)
Saduria entomon (L.) (1758 : 636)
Oniscus marinus L. (1758 : 637) [= *Idotea neglecta* Sars, 1897. See Heegard & Holthuis (1960)]
Idotea linearis (L.) (1767 : 1060)
Asellus aquaticus (L.) (1758 : 637)
Ligia oceanica (L.) (1767) : 1061)
Oniscus assimilis L. (1767 : 1061) [redet. *Sphaeroma serratum* (Fabricius, 1787)]
Oniscus asellus L. (1758 : 637)
Oniscus armadillo L. (1758 : 637) [redet. *Armadillidium vulgare* (Latreille, 1804)]

Acknowledgements

Especial thanks are due to Reg Harris for generously sharing with me his wide experience of relaxing dried specimens. I am indebted to Elizabeth Young for permission to examine the Linnaean collection, and to Alwyne Wheeler for guidance through the collection. Finally, my thanks go to Drs Ray Ingle and Tony Fincham for their invaluable advice and criticism in the preparation of this paper.

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Manuscript accepted for publication 12 September 1980